1.0 INTRODUCTION

This Site Reassessment of the Rico-Argentine site in Rico, Dolores County, Colorado (CERCLIS ID # COD980952519), has been prepared to satisfy the requirements of Technical Direction Document (TDD) No. 0305-0014 issued to URS Operating Services, Inc. (UOS) on May 23, 2003, by the Region VIII office of the U.S. Environmental Protection Agency (EPA). This report has been prepared in accordance with the EPA "Guidance for Performing Site Inspections Under CERCLA," Interim Final, September 1992, the "Region VIII Supplement to Guidance for Performing Site Inspections Under CERCLA", and the "Hazard Ranking System Guidance Manual" (U.S. Environmental Protection Agency (EPA) 1992a; EPA 1993b; EPA 1992b. No field work was conducted.

2.0 OBJECTIVES

The purpose of this site reassessment is to review data pertinent to the evaluation of the Rico-Argentine site with regard to the EPA's Hazard Ranking System (HRS) criteria. The specific objectives of this reassessment were to:

- Conduct interviews, as appropriate, and gather existing data;
- Review and document existing data; and
- Identify data gaps.

3.0 BACKGROUND INFORMATION

3.1 SITE LOCATION AND DESCRIPTION

THIS IS ENTIRE WATERSHED

The Rico-Argentine site is located in the Rico Mountains of southwestern Colorado and encompasses approximately 544,400 acres (Aqua-Hab, Inc. (AHI) 2001). The Rico-Argentine site includes the locations of inactive mining and milling operations in two drainages, the Dolores River and its tributary Silver Creek. The site includes the town of Rico, Colorado. The site extends northeast up the Silver Creek drainage to the current drinking water intake for the town of Rico on Silver Creek, and north along the Dolores River drainage to Peterson Slide, upgradient of the settling ponds, the St. Louis adit, and the location of the proposed drinking water intake for Rico. The site is located in eastern Dolores County, Colorado (Figures 1 and 2). The legal description of the site

than 10,000 ppb (USGS 1970; E&E 1991). Mercury was used for a short time as amalgum in mill processing in Rico (EPA 2003c).

The U.S. Department of Interior Bureau of Reclamation conducted surface water and sediment sampling in the Dolores River and its tributaries between 1989 and 1993. The results show Silver Creek to be a major, but not the only, source of mercury and other heavy metals in the upper Dolores River Basin (U.S. Department of the Interior, Bureau of Reclamation (BOR) undated).

In 1992, the site waterways were added to the list of impaired waterways under section 303(d) of the 1972 Clean Water Act (EPA 2003c).

A determination was made based on available data that the site could potentially qualify for the National Priorities List based on contaminants in surface water and soil exposure pathways. A 1994 Site Inspection Prioritization conducted by URS for EPA identified data gaps with respect to the HRS including source characterization, wetlands delineation and sampling, residential soil sampling, and target analysis (URS 1994). An Expanded Site Inspection was conducted in 1994 to acqu additional site data (URS 1996). Phase I and Phase II Environmental Assessments were conduc by Walsh Environmental Scientists and Engineers, Inc. (WALSH) and completed in 1995 as par the 1994 sale of property to Rico Properties, LLC, Rico Renaissance, and Rico Mountain L Claims and residential lots in town were mapped and categorized as to environmental risk. Se properties within Rico were identified as having been impacted by past mining activities and by n waste used as fill material. Releases of contaminants from mine sites were observed. Lead detected at concentrations ranging from 20 ~~micro~~milli grams per kilogram (mg/kg) to 12,000 mg/kg, detections of cadmium were 3 mg/kg to 84 mg/kg, and detections of copper were 9 mg/kg to 660 mg/kg (WALSH 1995).

The Atlantic Richfield Corporation (ARCO) initiated a voluntary environmental site characterization and remediation of five source areas around the town of Rico and the surrounding area within the framework of the Colorado Voluntary Cleanup and Redevelopment Act (Figure 3). The five areas included the Argentine Tailings, Columbia Tailings, Santa Cruz Mine, Silver Swan Mine, and Grand View Smelter. The Voluntary Cleanup (VCUP) activities occurred between July and November 1996 and included removal of waste rock and tailings material from active waterways and drainages; reconfiguration, consolidation, and stabilization of waste rock and tailings piles to minimize erosion

and eliminate slope instability; implementation of source controls to reduce the generation or transport of dissolved metals; capping and erosion protection to minimize the potential for direct human exposure to mill tailings and mine waste rock; and construction of passive treatment features to reduce current metal loadings from adit discharge to receiving waters (Anderson 1997). Following the completion and a two-year surface water monitoring program, ARCO requested a No Action Determination from the CDPHE Hazardous Materials and Waste Management Division (HMWMD). Since the VCUP actions covered only a portion of the Rico-Argentine site listed in CERCLIS, EPA determined that Superfund activities at the site could not be suspended (EPA 2000b).

A Compliance Sampling Inspection related to the CPDES permit was conducted by EPA Office of Enforcement, Compliance, and Environmental Justice, Technical Enforcement Program, in June 1998. St Louis adit Outfall 002 was sampled and results indicated that the permit was being violated (EPA 1998a).

A biological and aquatic survey along the Dolores River corridor was conducted in 2000 by Aqua-Hab Inc. (AHI) for the town of Rico that included a wetlands inventory using the 1987 Army Corps manual protocol (AHI 2001).

An EPA Classic Emergency Removal Action was conducted in April 2000 when one of settling ponds at the St. Louis adit overflowed into the Dolores River releasing metals to the surface water. The embankment was reinforced and a culvert added. In a sludge sample collected from the uppermost pond, cadmium was detected at 115 ppm, lead at 1,180 ppm, arsenic at 48.4 ppm, zinc at 23,700 ppm, and beryllium at 19.2 ppm (EPA 2000a; URS Operating Services, Inc. (UOS) 2000).

After the sale of the property containing the St. Louis adit, lime treatment system, and settling ponds to Rico Development Corp. by Anaconda, operation of the lime plant continued. After the property was sold, Rico Development Corp. stopped operation of the treatment system and ceased the water sampling and monthly reporting that is required under the Colorado Discharge Permit System (CDPS) permit. Reports indicate that even while in operation, the lime treatment was not sufficient to meet CDPS permit requirements for the effluent from the St, Louis adit (EPA 1998b). The retention time in the first of the settling ponds was insufficient because of the large

accumulation of sludge in the pond. The pH was generally too low for the zinc and cadmium to drop out of solution before discharging to the Dolores River. A dispute followed among Rico Development Corp, Rico Renaissance and ~~Rico Development Corporation~~ over who owned the portions of the land containing the environmental liability including the St Louis adit, the lime treatment facility, the settling ponds, and the CPDES permit. Unpermitted discharges resulted (EPA 1998a). Artesian wells drilled during mining exploration were observed flowing into some of the settling ponds. Pond berms eroded and untreated discharge flowed directly into the Dolores Ri A non-permitted discharge from the Blaine adit on Silver Creek was also observed flowing Silver Creek during this period (David L. Sell 1996; URS 1996).

IS THERE A 3RD PARTY?

Since 1990, the CDPS permit levels have been violated on numerous occasions. Notic Violation (NOV) and Cease and Desist Orders (CDO) were issued by the Colorado Departme Health in 1990, 1993, 1994, and 1996. Whole effluent tests, required as a control strategy re to the 304(1) listing, have been failed repeatedly. Discharge Monitoring Reports for Outfall 002, required by the CDPS permit have been delinquent or incomplete (CDPHE 1995). Adequate steps have not been taken to comply with permit requirements.. EPA records indicate that from January 1992 through May 1998, approximately 96 violations occurred at Rico Development Corporation's mine in Dolores County (EPA 1998b). The EPA and the State of Colorado filed suit against Rico Development Corporation et al. and that suit is pending (EPA 2000c). Table 1 contains analytical results that formed the primary basis for the litigation (EPA 1998b; URS 1996; CDM 1992; CDM 1993a; CDM 1993b; CDM 1993c; EPA 2003b; EPA 2003d).

Efforts are under way to resolve the issues identified. A study to evaluate treatment options for Blaine adit and St. Louis adit was conducted by J. E. Reynolds & Associates in 2000 (J. E. Reynolds & Associates 2000). In 2001, ARCO funded a Water Quality Assessment (WQA) to be completed by State of Colorado Water Quality Control Division to determine assimilative capacities for receiving streams currently and also under a new treatment facility (Atlantic Richfield Company (ARCO) 2001). ARCO provided comments to the WQA in August 2002 and CDPHE responded to those comments in 2003. (ARCO 2002; CDPHE 2003a). The conclusion of the WQA is that during low flow conditions, the assimilative capacity for zinc is exceeded by 31.6 pounds per day (lbs/day) and treatment must be accomplished at all seven identified point sources to meet zinc discharge limitations (CDPHE 2003a; ARCO 2002 CDPHE 2002). Efforts between CDPHE and ARCO are continuing to finalize this assessment (CDPHE 2003b).

According to HRS Guidance, conditions that existed at the time of the Comprehensive Environmenta Response, Compensation, and Liability Act (CERCLA) site investigation, conducted in September 1995 b UOS, may be used to evaluate the site using the HRS (EPA 1990; URS 1996).

A review was conducted of previous analytical data, primarily data collected since 1995. In many cases, noted in the detailed discussions that follow, the quality of the data is not known. Analytical methods varied or were not noted in reports. Except where data were collected according to HRS guidelines, data do not appear to have been validated and are, therefore, of unknown quality. A determination of data quality may be possible after a review of the complete laboratory packages. Those packages were not available for this site reassessment. Without the laboratory packages, Sample Quantitation Limits (SQLs), required for evaluation using HRS guidelines, can not be calculated.

In cases where the data were validated using the HRS guidelines for analytical interpretation, the following notation is used (Office of the Federal Register 1990). Elevated concentrations of contaminants reported as significantly above upgradient contaminant values are noted by a star (★) in two cases. The first is when the upgradient analyte concentration is greater than its SQL, and if the release sample analyte concentration is greater than its SQL, three times greater than the upgradient, and five times greater than the blank concentration. The second is when the upgradient analyte concentration is not greater than its SQL and if the release sample analyte concentration is greater than its SQL, greater than the upgradient SQL, and five times greater than the blank analyte concentration. If validation has occurred, data are acceptable for use unless qualified in the data table.

5.0 SOURCE CHARACTERIZATION

At one time there were twenty active mine sites in the Rico area. Several of the mine sites have been identified in or very near the Dolores River drainage or the Silver Creek drainage. In addition, reportedly, tailings were moved into the town of Rico as street cover and possibly as fill material around homes. In 1984, prior to recent VCUP activities, a total of 400,000 tons of source material were estimated to be in the Rico-Argentine area. Waste quantity was not documented by specific location (E&E 1984; EPA 1993a).

TAILS &/OR WASTE ROCK

Seven point source discharges to surface water have been identified by the CDPHE Water Quality Control Division within the three miles of the Rico-Argentine Mine area (Figure 2). A draft WQA completed in 2001 based on available data as part of the ARCO Colorado Discharge Permit System (CDPS) permit application

AWARE OF ANOTHER POINT DOWNSTREAM OF ARGENTINE TAILS ON SOUTH SIDE OF CREEK?

process indicated that during low flow conditions, the maximum assimilative loading capacity for zinc is 4.95 lbs/day. A total of 35.60 lbs/day of zinc are contributed by the seven point sources: St, Louis Ponds (17.81 lbs/day), Blaine adit (8.01 lbs/day), Argentine seep (3.75 lbs/day), Columbia tailings seep (4.81 lbs/day), Rico Boy adit (0.39 lbs/day), Santa Cruz adit (0.35 lbs/day), Silver Swan adit (0.48 lbs/day). The findings indicate that under the current circumstances of limited dilution, treatment must be accomplished at all locations in order to meet zinc CDPHE WQCD limitations. In addition, the Blaine adit has been observed recently discharging to Silver Creek (EPA 2003c). The Argentine seep discharges to a tributary to Silver Creek (CDPHE 2003b). The discharge from St. Louis adit, which combines with surface runoff, is routed through a series of settling ponds before discharging to the Dolores River. The Columbia tailings seep discharges to a side channel of the Dolores River. The Santa Cruz adit, Rico Boy adit, and Silver Swan adit discharge to wetlands that drain to the Dolores River (CDPHE 2002).

THIS HAS BEEN CURRENTLY REPAIRED EVEN THOUGH HISTORY OF DISCHARGE

urce characterization has occurred during a number of studies including the 1995 Expanded Site pection, the 1998 EPA Compliance Inspection, the 2000 EPA Emergency Response Removal Action, and 2000 ARCO sampling (EPA 1998; URS 1996; ESA 2000).

5.1 1996 EXPANDED SITE INSPECTION

Source samples were collected from the two abandoned cyanide leach pits along the Dolores River, a spring flowing from beneath the abandoned cyanide leach pits, the St. Louis adit outfall, the hot-tub geothermal spring, the uppermost settling pond, the lowermost settling pond, the drainage ditch between the upper settling ponds and the Dolores River, stained soil adjacent to a fuel tank at the mill site, the tailings piles along upper Silver Creek just below the old mill building, tailings at the confluence of Silver Creek and the Dolores River, and from two tailings piles along the Dolores River south of Rico, as shown in Figure 4. Samples were analyzed through the EPA Contract Laboratory Program (CLP) and data were validated and are acceptable for HRS use as qualified (URS 1996).

Analytical results for source inorganics are in Tables 2 through 4. Background for cyanide in the Rico area is approximately 0.5 ppm. Concentrations of cyanide detected in source sediment/soil samples from the uppermost cyanide leach pit, the tailings piles along Silver Creek, and the uppermost settling pond were significantly greater than concentrations detected in the background samples (URS 1996).

concentrations of arsenic, copper, iron, lead, manganese, silver, and zinc were detected at the downstream Silver Creek sample location (RA-SE-07) and were between one-half to one-tenth of the concentrations detected in the upstream location (RA-SE-06) (URS 1996).

6.2.2 Dolores River

In 1996, eight surface water samples and eight sediment samples, including a background sample, were collected from the Dolores River by URS. The background sample was collected on the east bank of the river, across from the Rico Ranger Station. The surface water total metals analytical results are in Table 14. Iron and manganese were found at elevated concentrations in all Dolores River surface water samples downstream of the background sample (RA-SW-01). Zinc was detected at elevated concentrations in samples collected downstream of sample RA-SW-02, all downgradient of the St. Louis Ponds (Figure 4). The highest concentrations of iron, manganese, zinc, and copper were detected in surface water sample RA-SW-08. Iron in the sample from this location was 54 times background, manganese was 20 times background, zinc was 68 times background, and copper was 8 times background. These elevated concentrations could not be attributed to Silver Creek or the Outfall 002 from the settling ponds, because concentrations detected in the upgradient sample on the Dolores River (RA-SW-04) are lower. There were also elevated concentrations of aluminum detected in samples RA-SW-02 and RA-SW-08. The concentrations detected were approximately 10 times background and there is no apparent source for these concentrations (URS 1996).

Elevated metals concentrations were detected in sediment samples RA-SE-08 and RA-SE-09 (Table 15). Both samples were collected near tailings piles that were being actively eroded by the Dolores River. Copper was detected at concentrations that were 9 times background in sample RA-SE-08 and 5.5 times background in sample RA-SE-09. Lead, manganese, and zinc were all detected at estimated quantities, below the detection limit, at elevated concentrations ranging from three to five times background (URS 1996).

be the weathering of the near surface mineralized bedrock, such as that found in the nearby mineralized fault. No anthropogenic sources of lead were observed in the immediate vicinity of the sample locations. The RC-3 samples document anthropogenic sources in the sample collected from 1 inch to 14 inches. RC-4 sample results, including speciation, documented that smelter activities may have contributed to detected lead levels. RC-5 samples documented that unmineralized bedrock is not a significant contributor of soil lead. RC-6 samples were collected to document lead levels present in the ancestral Silver Creek alluvial fan; however, the lead found in the fine fraction may have migrated from upgradient locations. RC-8 samples were collected to document lead concentrations from Greenstone; however, the soil sample may have been impacted by upgradient soil. RC-21 samples contained high levels of lead and since lead speciation was not conducted on that sample, the source is unknown (CDPHE 1996).

Several conclusions were reached by the investigators from the CDPHE: 1) Natural sources of the elevated lead levels are present in the Rico town area. These sources are related to the exposure of and weathering of mineralized bedrock and characteristically contain lead-bearing manganese and iron oxide phases that are produced by the oxidation and hydrolysis or original mineral assemblages. 2) Anthropogenic sources of elevated lead contents are present in the Rico town area including waste rock, mill tailings, and smelter slag. The mining-related wastes were determined to be physically and mineralogically different from materials derived from the erosion and weathering of mineralized bedrock. 3) Impacts on soil of the sulphuric acid plant appear to be minimal. 4) The efforts to identify smelter emission products were inconclusive and would require a more extensive study. Smelter emissions may not be a significant contributor to lead in soil because of the short period of operation, the small quantities of lead processed, and the prevalence of other lead sources (CDPHE 1996).

7.4 2003 EPA OFFICE OF RESEARCH AND DEVELOPMENT SOIL SAMPLING

Surface soil sample were collected in the town of Rico in areas of residential use or planned residential use. Samples were collected in locations where XRF field screening results for the contaminants of concern, lead, zinc, mercury, and arsenic, were the highest. The purpose was to determine if further study or remediation investigation would be required prior to development (EPA 2003a). Samples were analyzed for metals by the Land Remediation and Pollution Control Division staff (ORD) laboratory. Data were not validated; however, the laboratory data package can be made

more than three times the concentration of the background sample at 11 of the 12 locations as shown in Table 22 (CDPHE 2003).

8.3 GROUNDWATER ATTRIBUTION AND TARGETS

In 1994 the Colorado State Engineers Office listed three wells as household use (Colorado Office of the State Engineer 1994). Two of the wells are located approximately 0.5 mile upgradient of the St. Louis adit. The third domestic well is at the south end of the town of Rico (URS 1996) Reportedly, there are three domestic wells located south of Rico in a housing development that have not been sampled (EPA 2003c). Within the four-mile site radius, in addition to the domestic well there is one industrial well owned by Rico Development Corporation. The site does not lie within a wellhead protection area (URS 1994).

Rico is served by a municipal drinking water system. The intake is located upgradient of the Blaine adit and the Argentine tailings on Silver Creek (Figure 2). The water is piped from that location to Rico. Concern exists that contaminated groundwater may be infiltrating the municipal drinking water system at unknown locations (EPA 2003c). No municipal drinking water sample data are known to exist. A new water intake has been proposed to be located above Peterson Creek (Figure 2) (EPA 2003c).

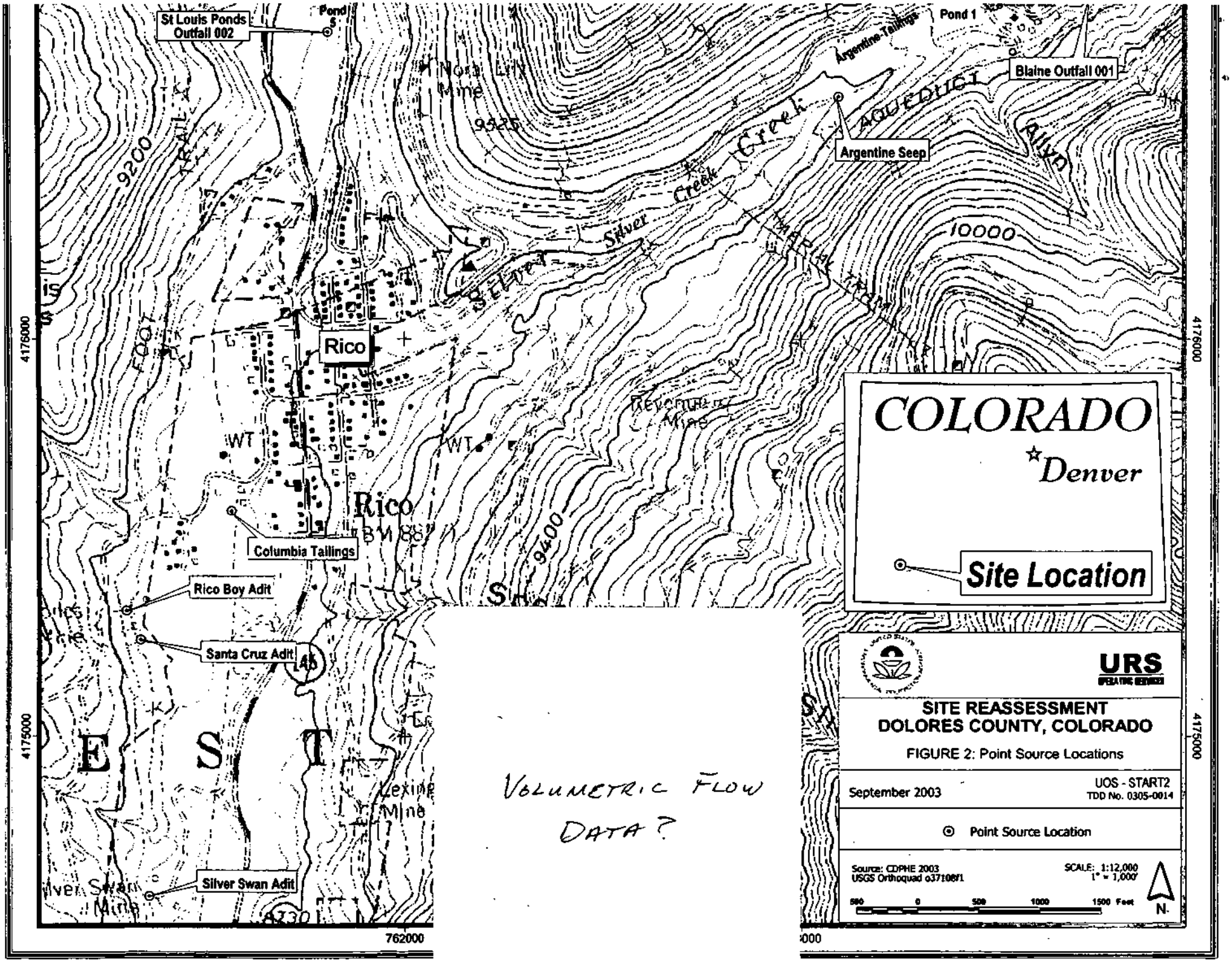
CK W/ DAVE ROGERS WQCONT. DIV. ST. OF CO

9.0 GROUNDWATER TO SURFACE WATER PATHWAY

The groundwater to surface water pathway has not been evaluated and no information is available regarding the extent to which contaminants detected in limited groundwater sampling may impact surface water.

10.0 AIR PATHWAY

The air pathway is not being evaluated because there is no indication that there is a release to the air pathway (URS 1996).



VOLUMETRIC FLOW DATA?

TABLE 1
CDPS Permit Violations
Concentrations in µg/L

Parameter	SCDM AWQC	CDPS Limit	Violation Date	Outfall 002 Reported 30-Day Average Concentration
Zinc	110	440	05/31/94	610
Zinc	110	880	05/31/94	910
Copper	12	30	06/30/94	32
Lead	3.2	10	07/31/94	65
Cadmium	1.1	10	10/31/94	20
Zinc	110	237	03/31/95	950
Cadmium	1.1	0	03/31/95	3
Zinc	110	237	04/30/95	570
Cadmium	1.1	0	04/30/95	3.5
Zinc	110	237	05/31/95	750
Cadmium	1.1	0	05/31/95	6.5
Zinc	110	237	06/30/95	7,020
Cadmium	1.1	0	06/30/95	45
Zinc	110	237	07/31/95	2,850
Cadmium	1.1	0	07/31/95	12.5
Zinc	110	237	08/31/95	282
Zinc	110	237	09/30/95	370
Cadmium	1.1	0	09/30/95	2.5
Silver	4.1	0	10/31/95	5.5
Zinc	110	237	10/31/95	275
Silver	4.1	0	11/30/95	1
Zinc	110	237	11/30/95	320
Silver	4.1	0	12/31/95	3.5
Zinc	110	237	12/31/95	220
Silver	4.1	0	10/31/96	0.2

TABLE 16
2003 Targeted Brownfields Assessment
Surface Water Analytical Results
Concentrations are in µg/L

Metal	SCDM AWQC	RLP-DR-SW1 Dolores River - Background	RLP-DR-SW2 Dolores River adjacent to settling ponds	RLP-OC-SW1 Side channel of the Dolores River background	RLP-OC-SW2 Side channel of the Dolores River adjacent to settling ponds
Arsenic	190	17 U	17 U	17 U	17 U
Barium	-	66 J	66 J	76 J	64 J
Cadmium	1.1	2 U	2 U	2 U	2 U
Chromium	11	2 U	2 U	2 U	2 U
Copper	12	1.2 U	1.2 U	1.2 U	1.2 U
Iron	1,000	110	78	61	230
Lead	3.2	140 U	14 U	14 U	14 U
Manganese	-	19	82	16	150
Mercury	0.12	0.03 U	0.03 U	0.03 U	0.03 U
Zinc	110	7 J	6.3 J	12 J	44 J

J The associated numerical value was detected above the Method Detection Limit (MDL) but below the Practical Quantitation Limit (PQL) or because Quality Control Criteria were not met. Presence of the analyte is reliable.
U Not detected at the reported value.
* TVS are for a mean hardness of 169 mg/L

Source: CDPHE 2003; EPA 1996b

DOES THIS NEED TO BE INCLUDED